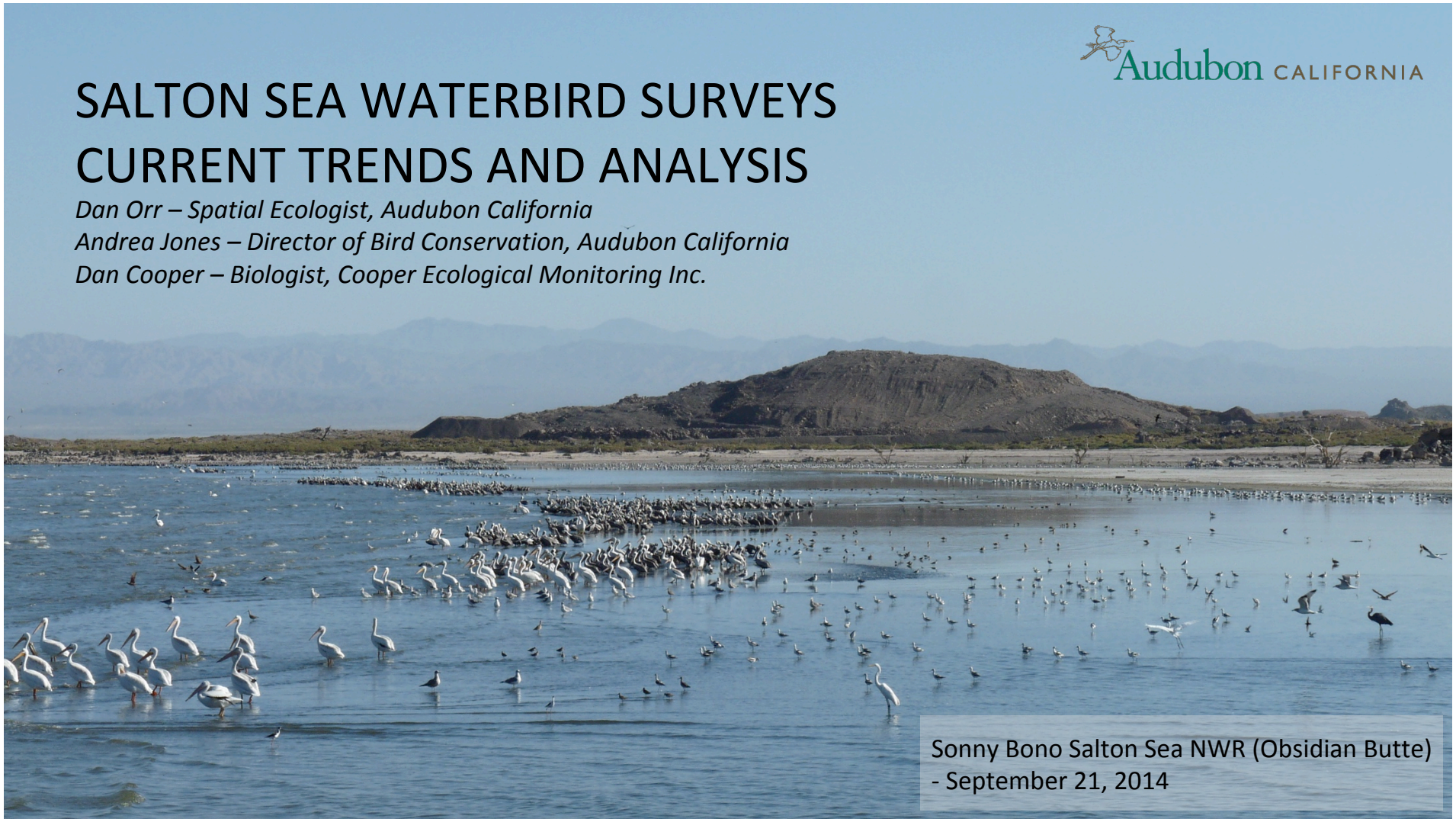
The following presentation was presented to the Science Committee at its June 11, 2018 meeting for informational purposes. It does not constitute endorsement of any kind by the State of California or the Science Committee.

SALTON SEA WATERBIRD SURVEYS
CURRENT TRENDS AND ANALYSIS

Dan Orr – Spatial Ecologist, Audubon California
Andrea Jones – Director of Bird Conservation, Audubon California
Dan Cooper – Biologist, Cooper Ecological Monitoring Inc.



Sonny Bono Salton Sea NWR (Obsidian Butte) - September 21, 2014

Salton Sea Environmental Changes

- Water level and salinity
- Changing habitats
- Changing prey availability

Audubon California Salton Sea Waterbird Survey

(fine scale short term trends)

- Overview
- Trends

Audubon Christmas Bird Count

(larger scale long term trends)

- Eared Grebe trends
- Impacts relative to environmental change

Salton Sea Environmental Changes

Water level and salinity

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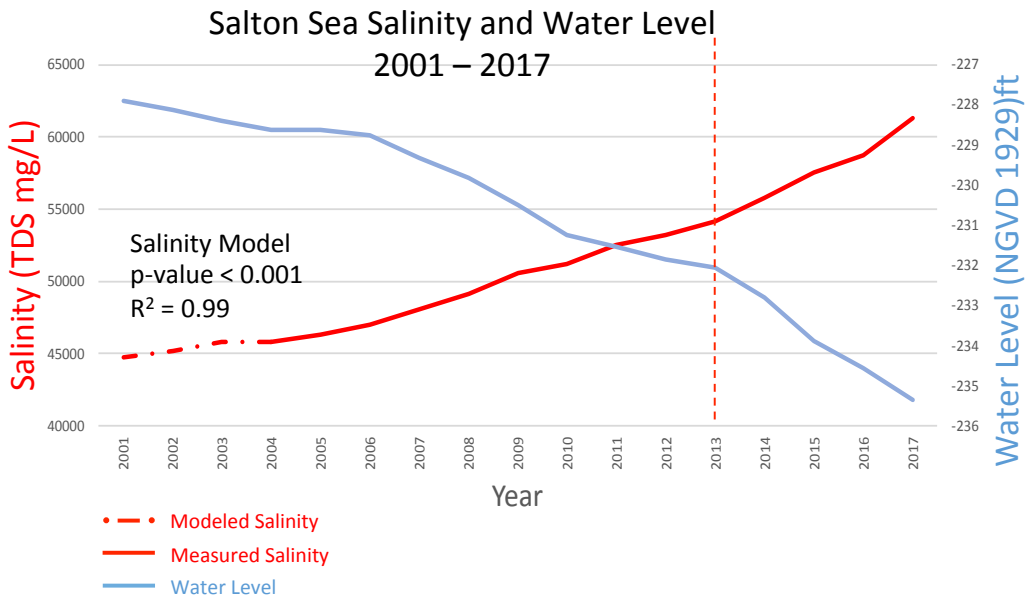

Increase in salinity and decrease in water level over time at the Salton Sea *(data from Bureau of Reclamation)*

2013 saw increased water drawdowns

Let's look at the rate of change (slope) over time instead of the raw values over time to identify moments of change

Salton Sea Environmental Changes

Water level and salinity

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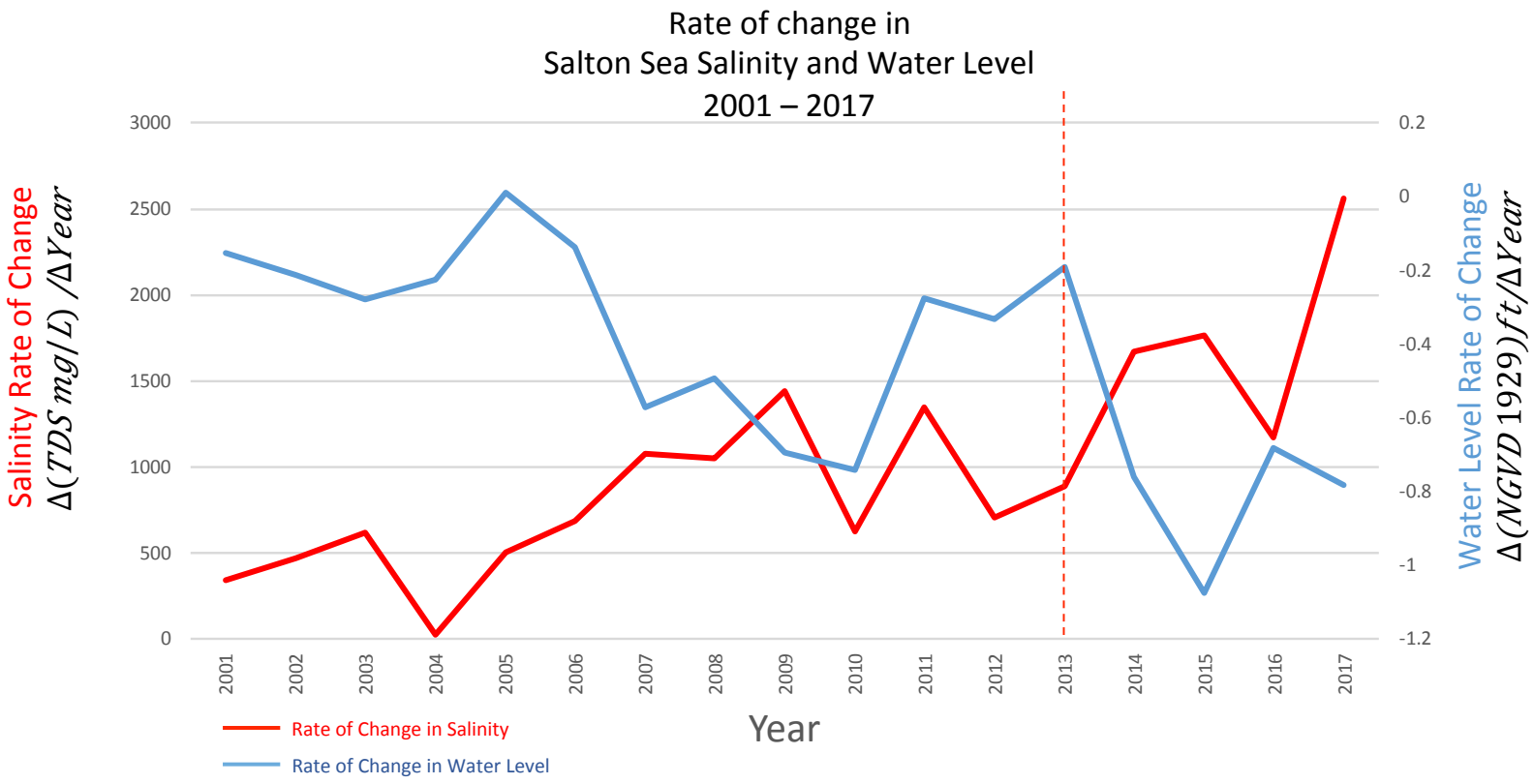

Salton Sea Environmental Changes

Water level and salinity

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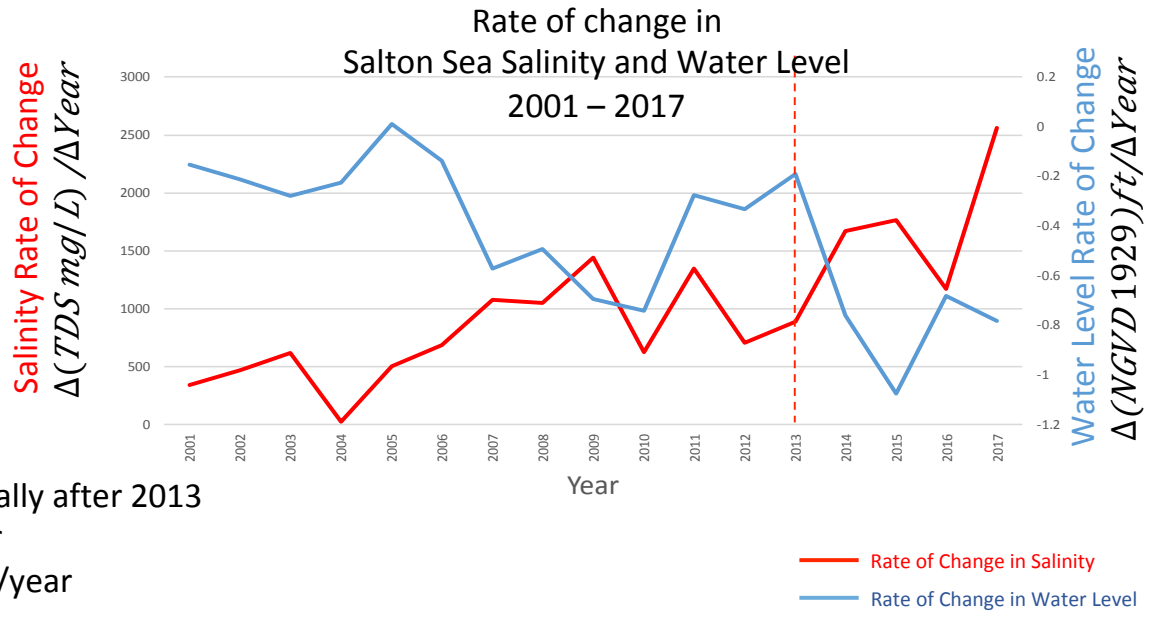


Rate of increase in salinity increases dramatically after 2013

- 2013 had increase of 887.5 mg/L/year
- 2014 had an increase of 1666.7 mg/L/year
  - That is an 88% increase

Rate of decrease in water level increases dramatically after 2013

- 2013 had decrease of 0.192 feet/year
- 2014 had an decrease of 0.76 feet/year
  - That is an 296% increase in the rate of water level loss

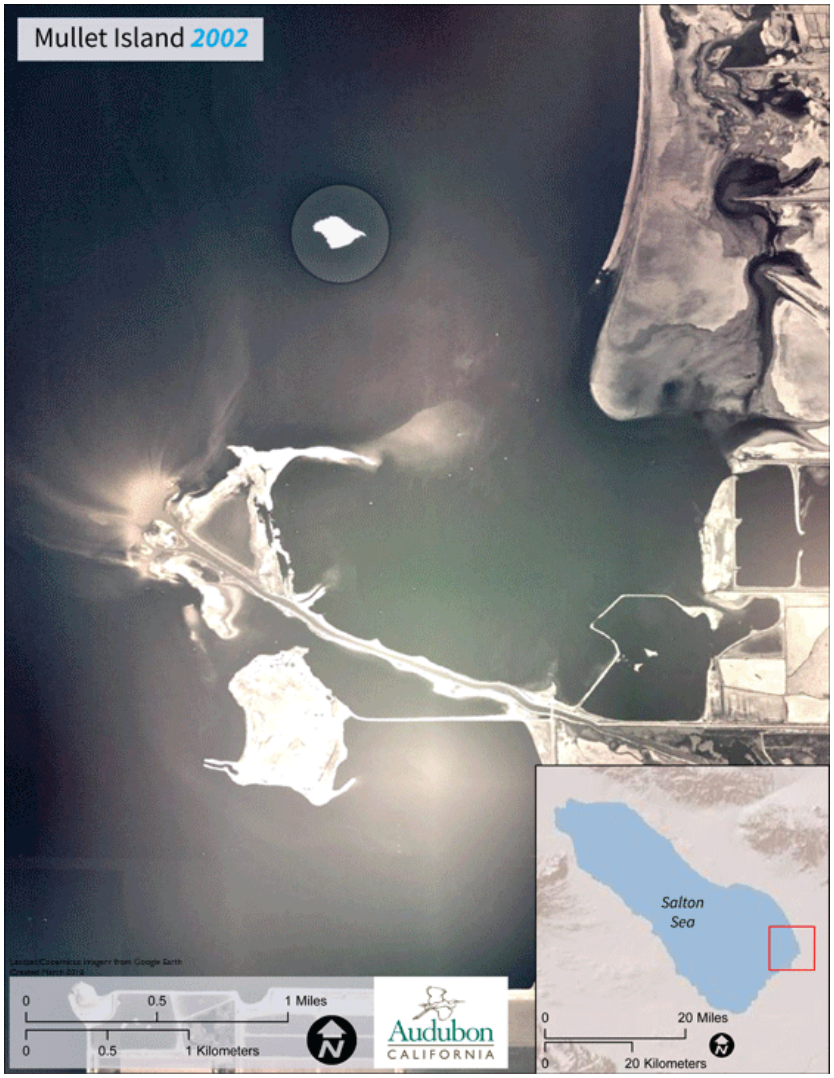
Salton Sea Environmental Changes
Habitat and prey availability

For Birds

Changes in water level impact habitats

Changes in Salinity impact prey species

- e.g. Fish



Salton Sea Environmental Changes

Habitat and prey availability

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Johnson's Landing (Salton City)
February 2015
Photo: Dan Cooper

Johnson's Landing (Salton City)
June 2016
Photo: Dan Cooper

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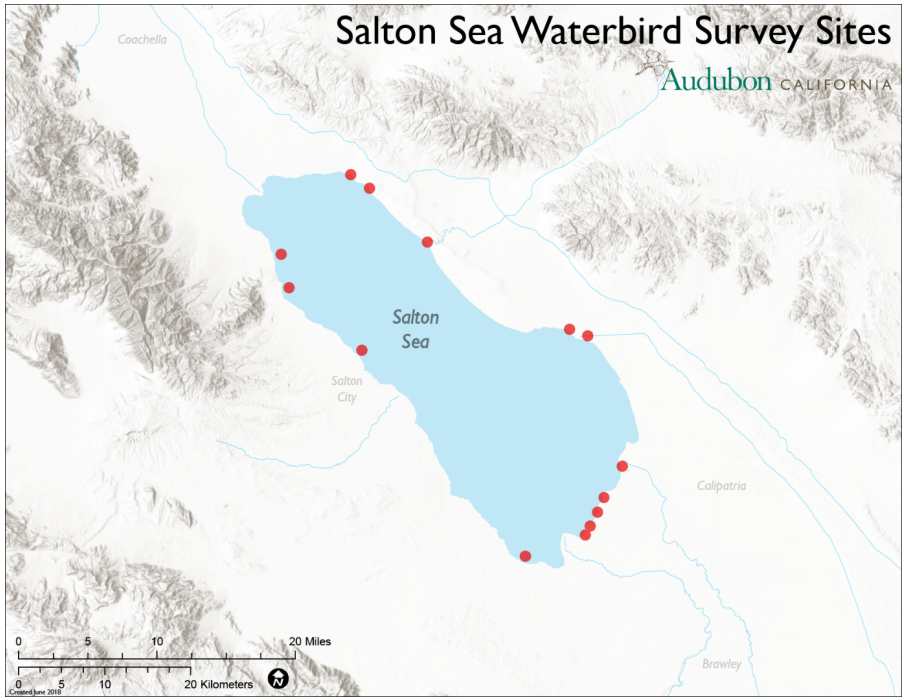
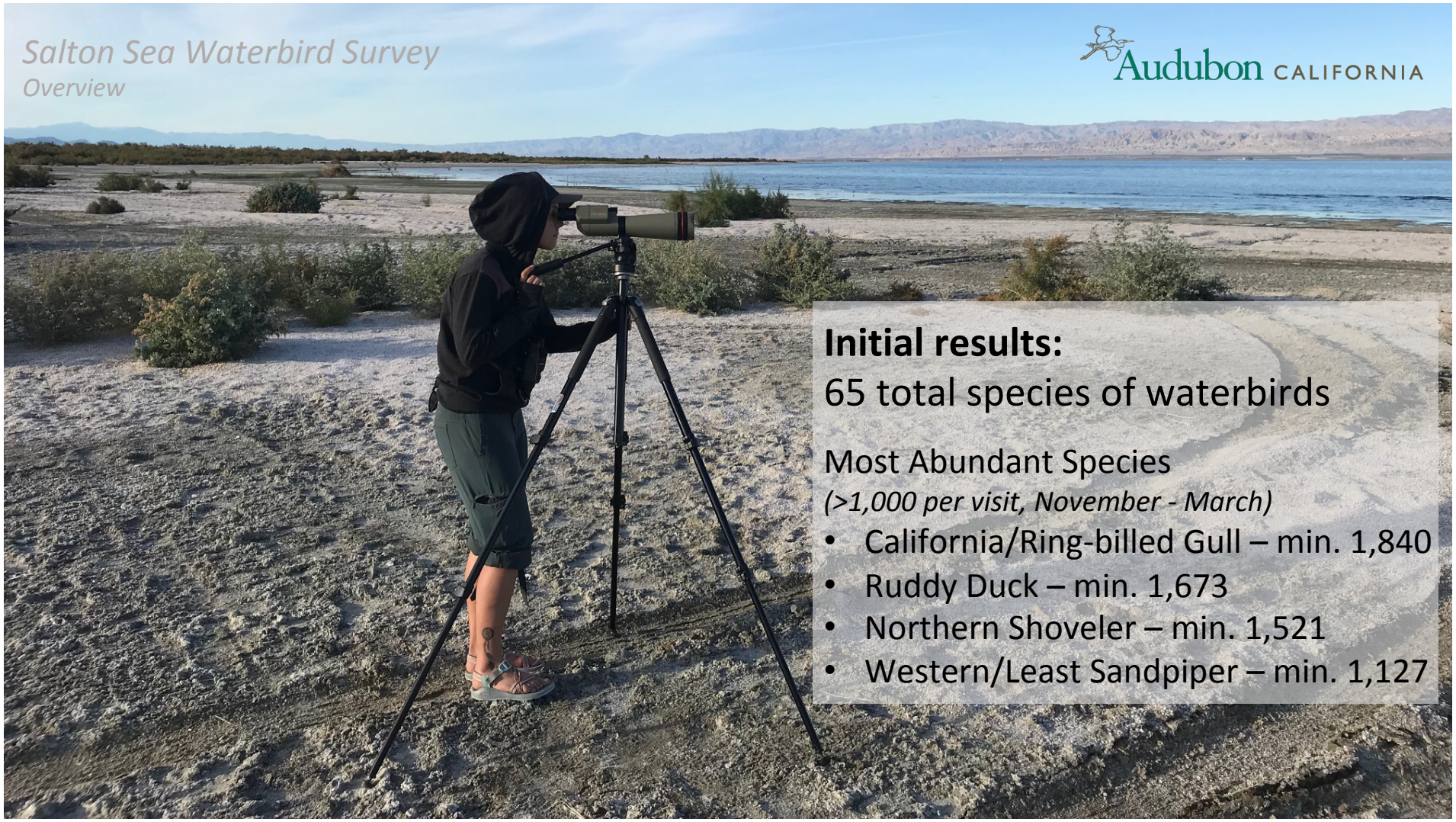


Salton Sea Waterbird Surveys

- Nov 2016 – Mar 2018
- 14 Sites
- 1km^2 survey boxes
- Surveyed every 2 months
- 20 minute counts/box


Salton Sea Waterbird Survey
Overview
Audubon CALIFORNIA
Initial results:
65 total species of waterbirds
Most Abundant Species
(>1,000 per visit, November - March)
• California/Ring-billed Gull – min. 1,840
• Ruddy Duck – min. 1,673
• Northern Shoveler – min. 1,521
• Western/Least Sandpiper – min. 1,127

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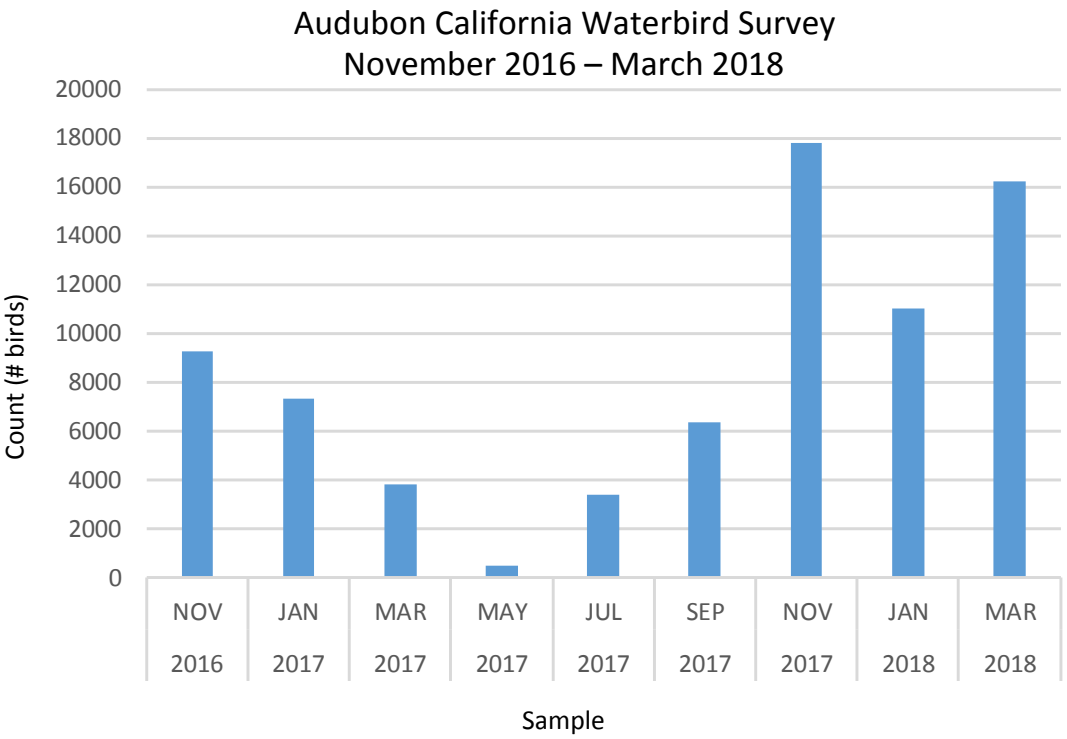
Total number of birds over the survey period



Salton Sea Waterbird Survey

Trends and analysis

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Is this a shift in functional groups?

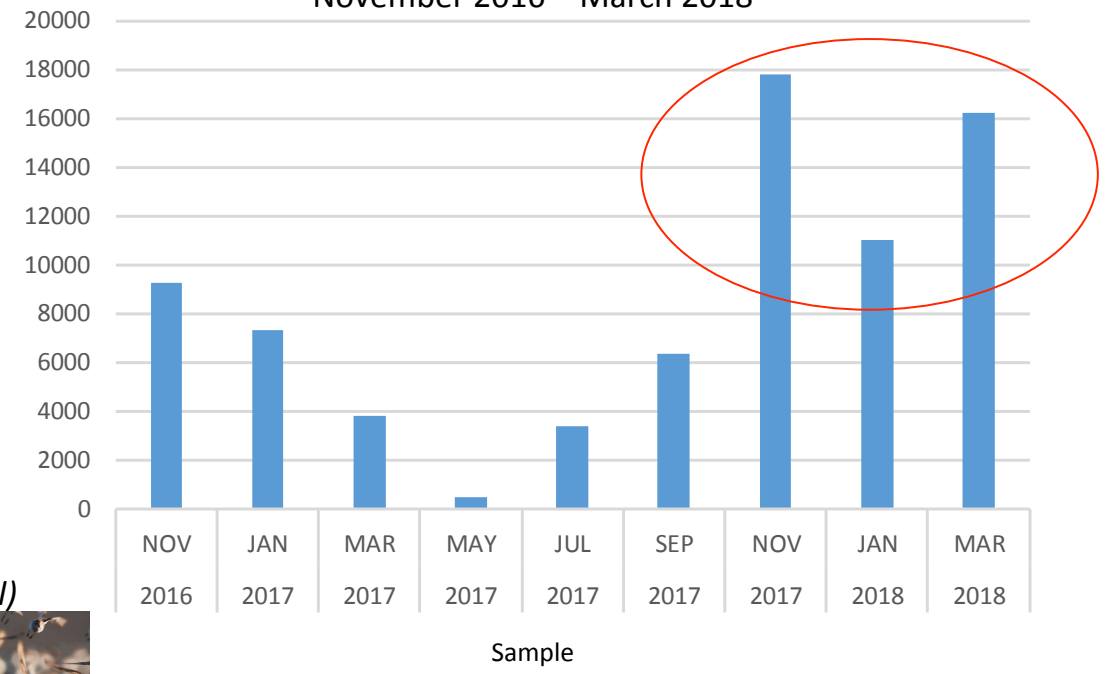
- Habitat changes
- Prey availability

Few fish eating birds

(Higher Trophic Level)

Many shorebirds

(Lower Trophic Level)



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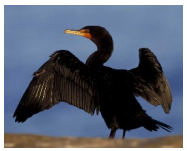
Decrease in birds feeding at higher trophic levels (Nov./Jan./Mar.)

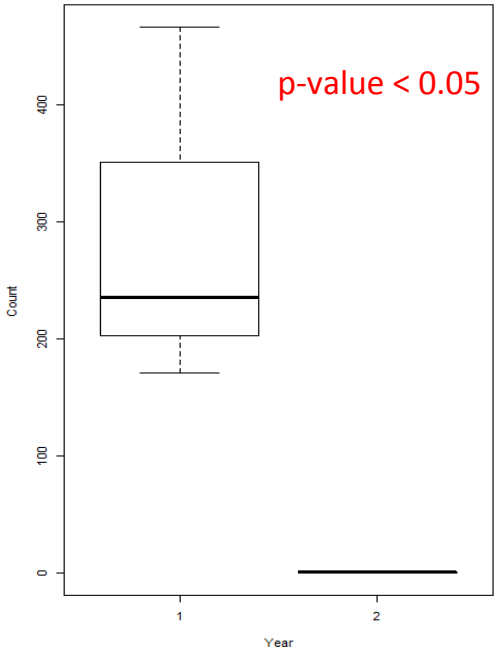
- *Statistically significant*

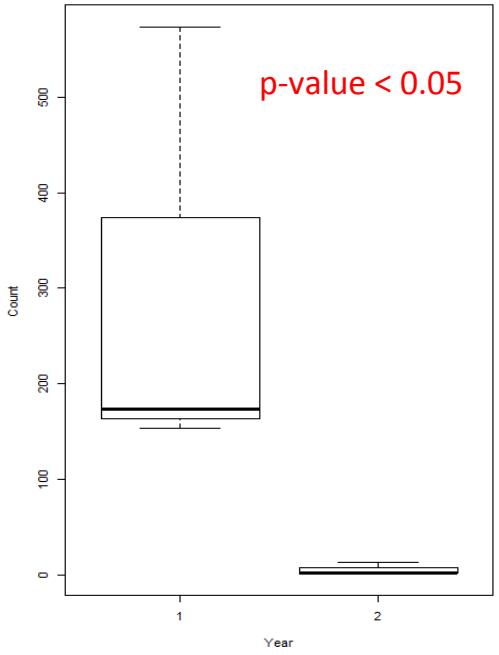
Eared Grebe

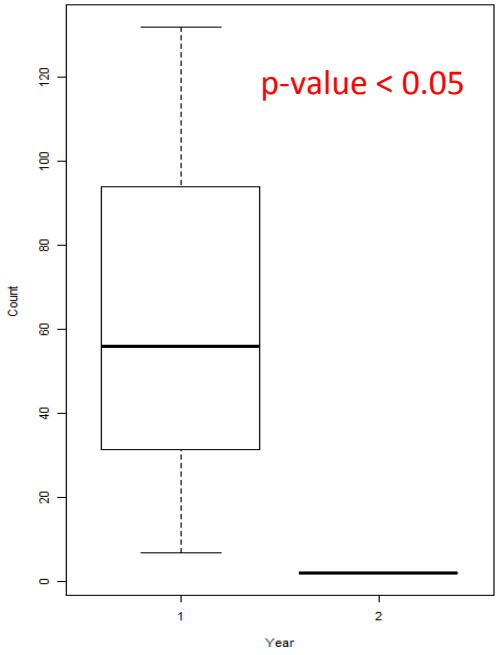
American White Pelican



Double-crested Cormorant







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Birds feeding at lower trophic levels (Nov./Jan./Mar.)

- *Appear to be stable or increasing based on limited data*


Least/Western Sandpiper


Dowitcher spp.


Ruddy Duck


American Avocet


Black-necked Stilt


Northern Shoveler

Short Term and Fine Time Scale

Could be shift in functional groups?

- These analysis indicate a loss of higher trophic level birds
- Trends suggest we may see increases in lower trophic level birds
  - Not all are statistically significant
  - Additional years of data will refine results


Len Blumin


Seawall, September 2017
Dan Cooper

Population Level Impacts

- Unknown
- Salton Sea is important to migratory birds
- Several rely on saline lakes

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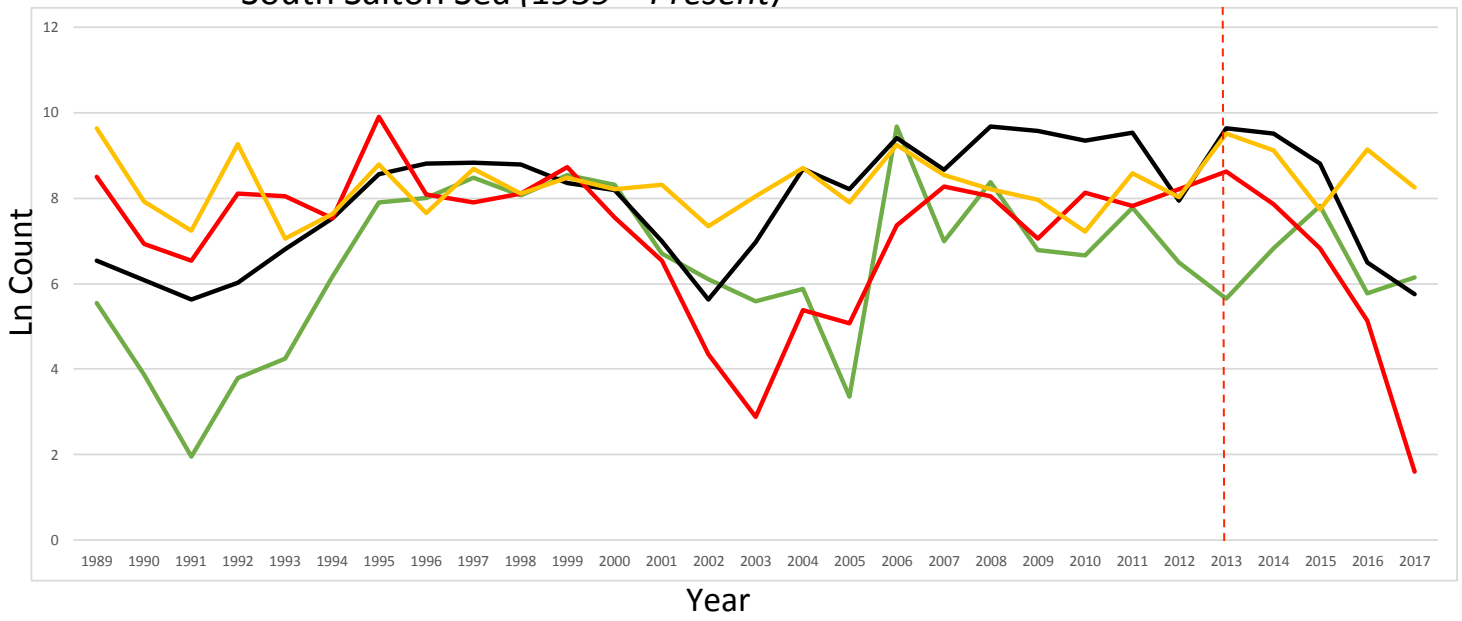
Audubon's Christmas Bird Count

- Community Science
- Long term dataset
  - North Salton Sea *(1965 – Present)*
  - South Salton Sea *(1939 – Present)*



CBC Salton Sea **South**
1989 - 2017

- Eared Grebe
- American White Pelican
- Double-crested Cormorant
- Ruddy Duck
- Increased Water Drawdowns

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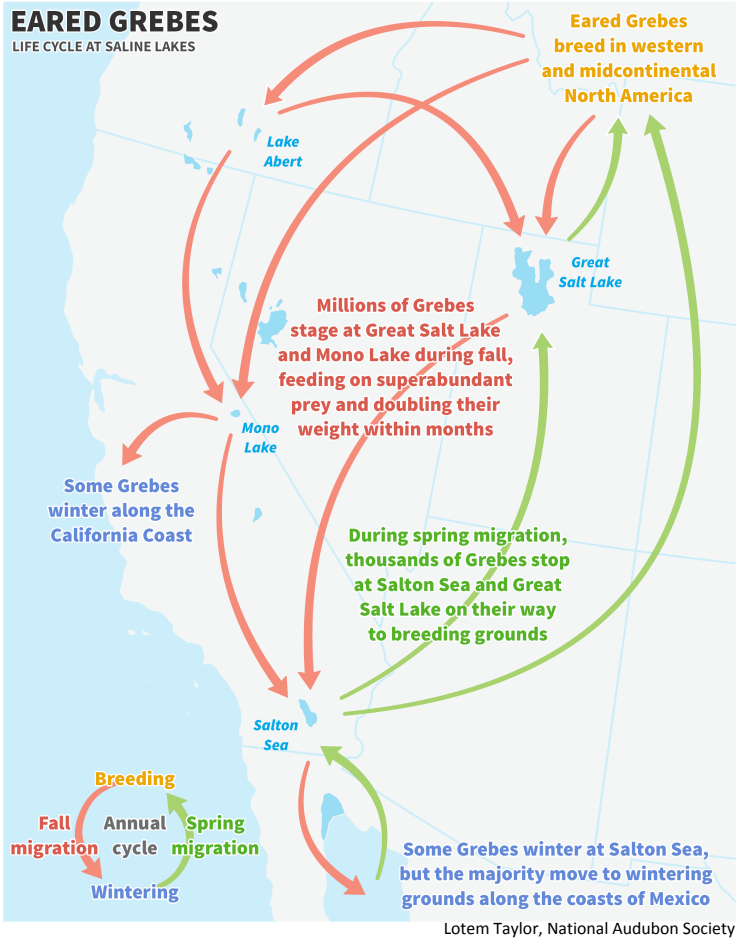
Eared Grebes

- Abundant but vulnerable to habitat change
- Life history is reliant on saline lakes
- Est. 90% of CA population stopped in winter on the Salton Sea in the past



Lotem Taylor, National Audubon Society

Audubon Christmas Bird Count

Impacts relative to environmental change

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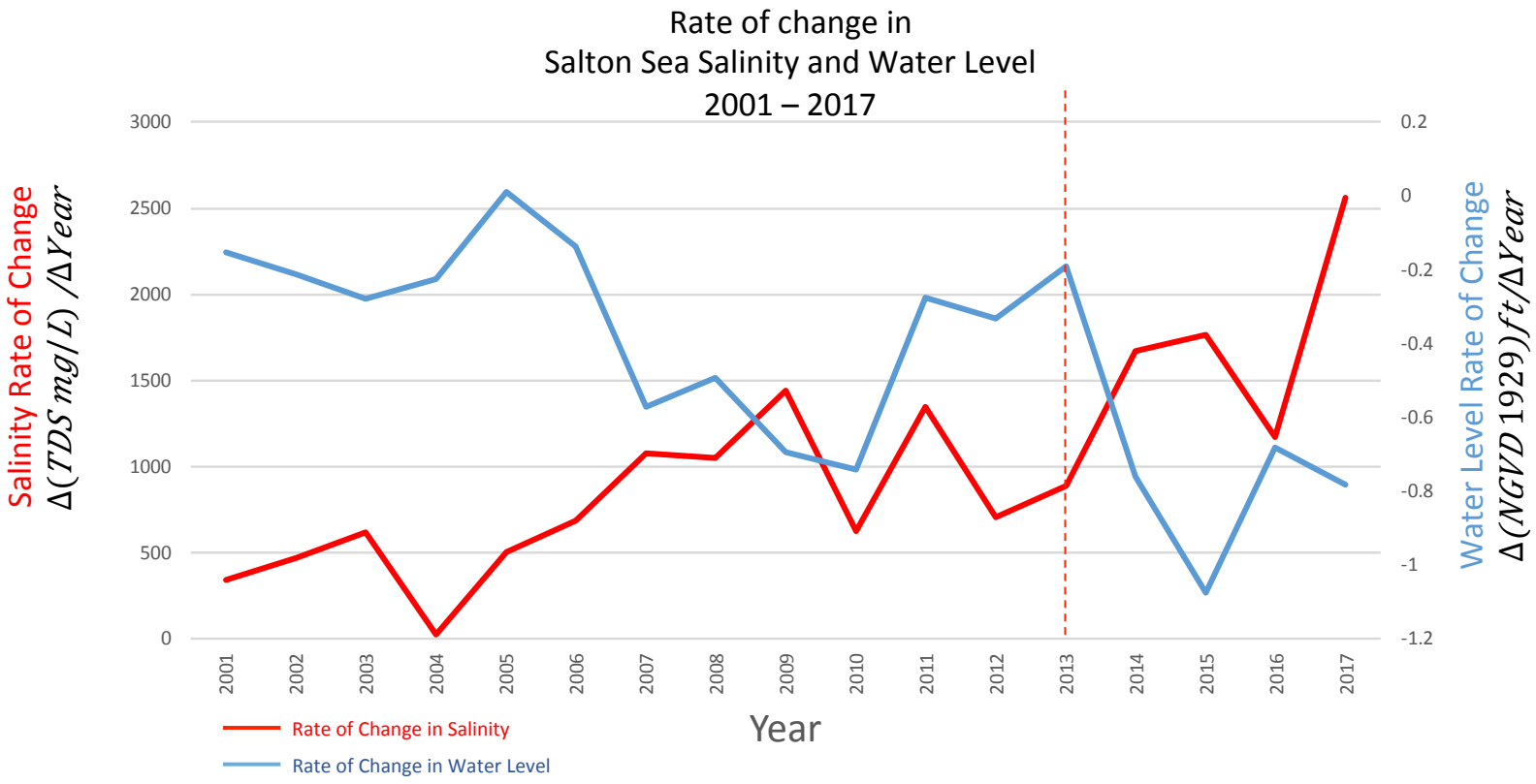

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Do increased Drawdowns Lead To Impact To Populations?

Before After Control Impact Paired Series (BACIPS) analysis

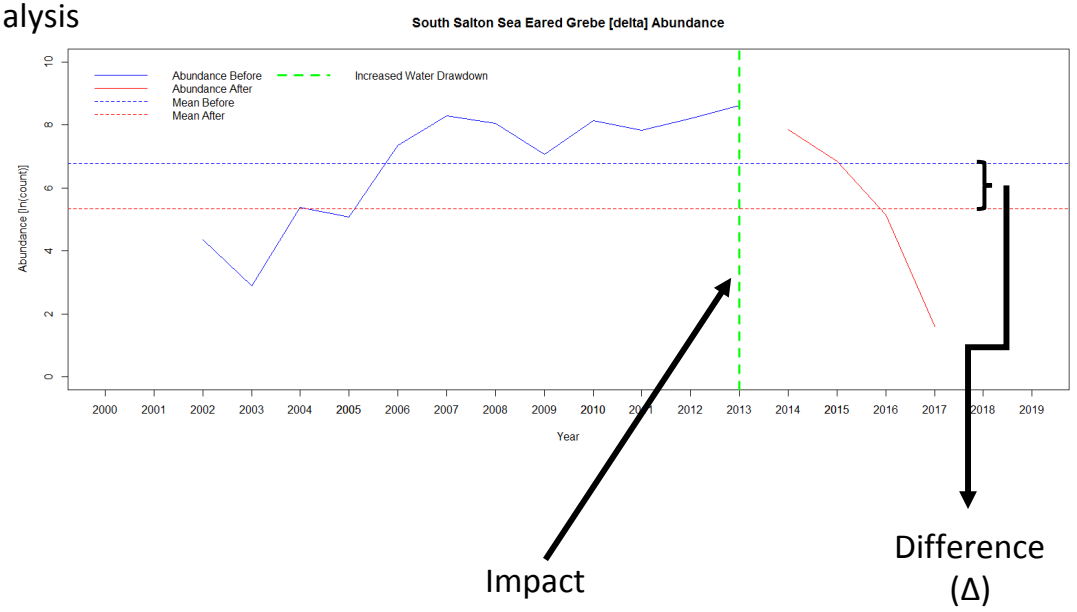
Pair Control and Impact Sites

- Impact – Salton Sea
- Control – Mono Lake (used here)
- More Control sites to come

Eliminates Natural Environmental Variation in Population as Cause

Test For Differences In Change

- Between sites before and after impact (2013)
- NOT differences in abundance between sites



Audubon Christmas Bird Count

Impacts relative to environmental change

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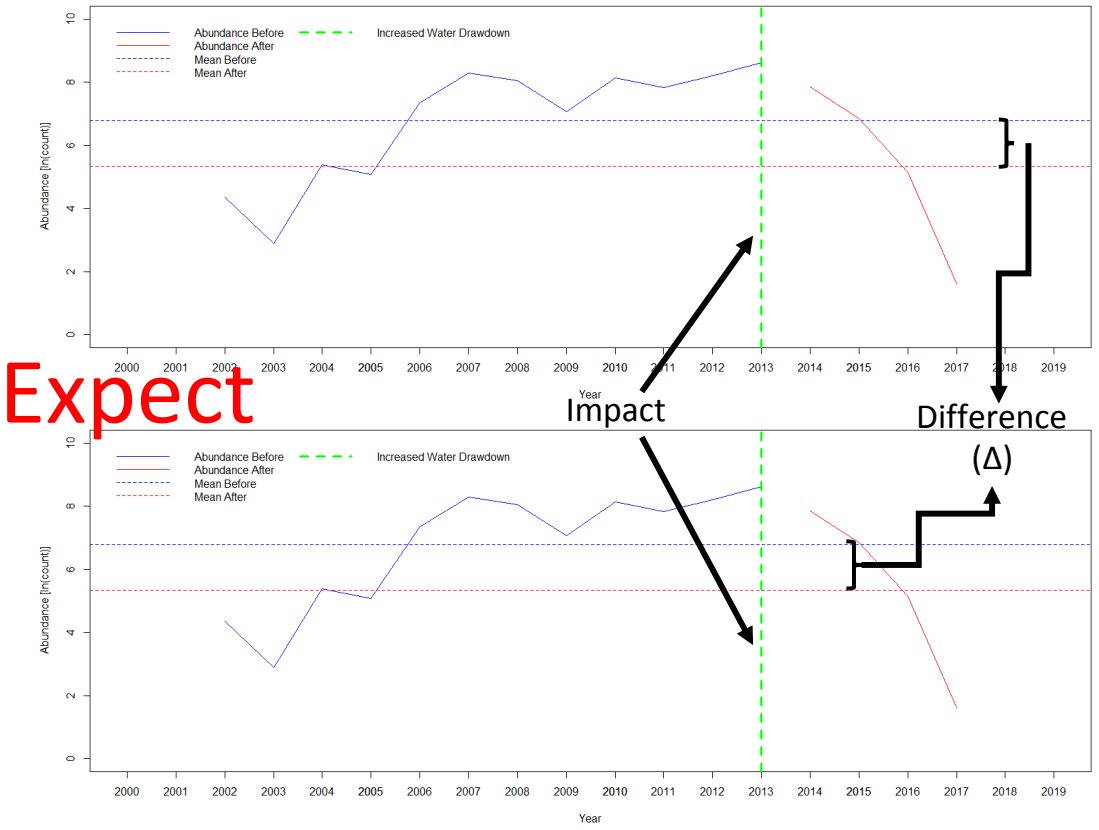
If both sites experience the same general natural environmental variability or climatic anomalies (i.e. drought/El Niño/La Niña)

- Expect differences between two time periods at each site to be similar
- If different
  - Points to local impact as cause
  - Eliminates natural environmental variation as cause



Audubon Christmas Bird Count

Impacts relative to environmental change

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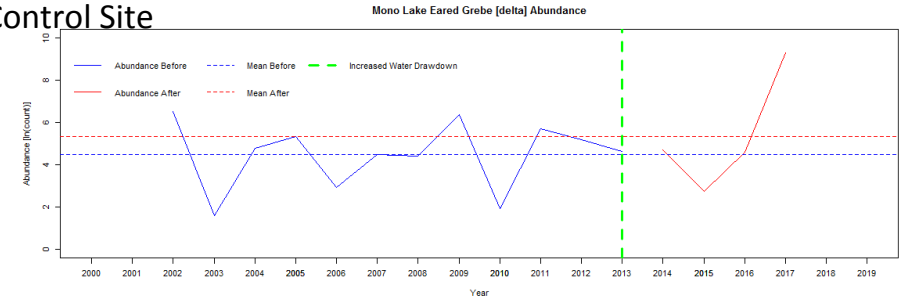
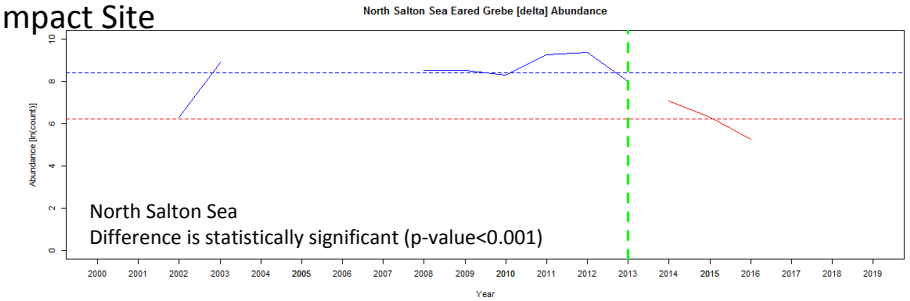
Preliminary Results

- Differences between time periods at Control and Impact sites are significantly different
- Points to local impact as cause
- Not a population or regional trend

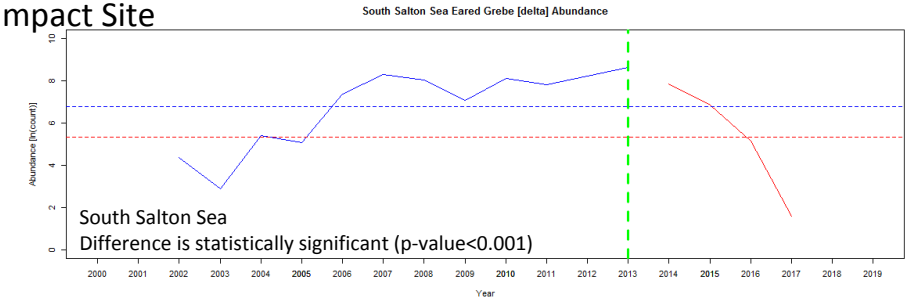
Control Site



Impact Site



Impact Site



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Environmental Changes At The Salton Sea Impact Bird Populations

- Impacts to species reliant on saline lakes
- May lead to changes in functional diversity

Salton Sea Ecosystems Loss

- Mosaic of habitat types
- Birds are ecologically important
- Birds are indicator species

Recovery Will Require Special Management

- Prioritize species and habitats of high value
  - Regional scale
  - Flyway scale
- Habitat creation and maintenance
  - Wetlands
  - Nesting Islands
- Reliable fishery


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Next steps/discussion items
• Future surveys? Add survey sites/change methods?
• Additional research?
• How to prioritize species of concern/habitats as habitats are constructed
• Are some birds winner's/loser's in the future of the Sea?